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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/940,758

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Jean Louis Calvignac

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EXAMINER

NGO, NGUYEN HOANG

ART UNIT

PAPER NUMBER

2663

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/940,758

Applicant(s)

CALVIGNAC ET AL.

Examiner

Nguyen Ngo

Art Unit

2663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-29 and 35-39 is/are allowed.
- 6) ☒ Claim(s) 1-3, 12 and 30-34 is/are rejected.
- 7) ☒ Claim(s) 4-11, 13, and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. This communication is in response to the amendment of 7/1/2005. All changed made to the Specification, Drawings, and claims have been entered. Accordingly, Claims 1-39 are currently pending in the application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 12, 30, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Chandrasekaran (US 6862281), hereinafter referred to as Chandrasekaran.

Regarding claim 1, Chandrasekaran discloses a method of segmenting packet routing lookups into multiple levels for sequential search (method for identifying a data structure associated with a packet of data, abstract). Chandrasekaran further discloses;

receiving a packet (receiving a packet of data, col4 lines 15-16).

having the header read by means well known in the art, such that the protocol field located in the IP header is read and used to perform lookup in the Protocol table

(selecting a table to be accessed using said search key, col4 lines 16-19).

Chandrasekaran further discloses that the lookup function consists of extracting certain elements of the packet header to use as a lookup key (extracting one field from a packet header of said packet of data to generate a search key, col1 lines 55-60).

that the lookup in the protocol table, which determines a pointer to the root tree for a particular server flow associated with the inbound packet, returns the value of the Server Flow Table root tree pointer sFlowRTP (determining whether to identify said data structure associated with said packet of data using a tree based on a table definition of said selected table, figure 4 and col4 lines 18-22) and that if the sFLOWRTP is a valid number, then the IP address and port number fields from the packet header are concatenated and used to as the lookup key in a CAM lookup and that the value returned by this lookup is the pointer to the particular Client Flow Table containing the client flow routing information, designated cFLOWRTP (col4 lines 30-29).

that matching entry at address "N" thus provides a pointer to a secondary RAM (data structure) structure containing the corresponding cFLOWRTP (col5 lines 1-5) and thus switching said packet using said flow entry located in the RAM (identifying said data structure associated with said packet of data in response to said determination step, col9 lines 29-32).

Regarding claim 2, Chandrasekaran discloses all the limitations of claim 2 as discussed from claim 1. Chandrasekaran discloses;

that the lookup in the protocol table, which determines a pointer to the root tree for a particular server flow associated with the inbound packet, returns the value of the Server Flow Table root tree pointer sFlowRTP (transferring search key to a tree search engine (protocol table), figure 4 and col4 lines 18-22) and that a number of different table organizations are equally applicable to CAM type lookups, in particular a Patricia tree for providing more efficient access structure for CAM type lookups (protocol table based on a tree search engine, col5 lines 50-56).

that if the sFLOWRTP is a valid number, then the IP address and port number fields from the packet header are concatenated and used to as the lookup key in a CAM lookup and that the value returned by this lookup is the pointer to the particular Client Flow Table containing the client flow routing information, designated cFLOWRTP (associating said search key with a particular thread number/table number pair (pointer), col4 lines 30-29).

Regarding claim 12, Chandrasekaran discloses that the ultimate Layer flow 4 flow entry values are unique to the search keys used (col5 lines 23-26) and that the final lookup step returns a MAC rewrite information (action on packet) necessary to provide layer 4 destination information for the packet's next hop (performing a particular action on said packet of data based on said data structure identified in said data structure memory, col5 lines 25-29).

Regarding claim 30, Chandrasekaran discloses a method of segmenting packet routing lookups into multiple levels for sequential search (method for identifying a data structure associated with a packet of data, abstract). Chandrasekaran further discloses; receiving a packet (receiving a packet of data, col4 lines 15-16).

having the header read by means well known in the art, such that the protocol field located in the IP header is read and used to perform lookup in the Protocol table (selecting a table to be accessed using said search key, col4 lines 16-19).

Chandrasekaran further discloses that the lookup function consists of extracting certain elements of the packet header to use as a lookup key (extracting one field from a packet header of said packet of data to generate a search key, col1 lines 55-60).

that the lookup in the protocol table, which determines a pointer to the root tree for a particular server flow associated with the inbound packet, returns the value of the Server Flow Table root tree pointer sFlowRTP (transferring said search key to a CAM by a tree search engine configured to identify said data structure associated with said packet of data, figure 4 and col4 lines 18-22) and that if the sFLOWRTP is a valid number, then the IP address and port number fields from the packet header are concatenated and used to as the lookup key in a CAM lookup and that the value returned by this lookup is the pointer to the particular Client Flow Table containing the client flow routing information, designated cFLOWRTP (identifying a particular entry number in said CAM memory based on said search key, col4 lines 30-29).

that matching entry at address "N" thus provides a pointer to a secondary RAM (data structure) structure containing the corresponding cFLOWRTP (col5 lines 1-5) and

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thus switching said packet using said flow entry located in the RAM (identifying said data structure associated with said packet of data based on said particular entry number in said CAM, col9 lines 29-32).

Regarding claim 31, Chandrasekaran discloses that matching entry at address "N" thus provides a pointer to a secondary RAM (data structure) structure containing the corresponding cFLOW RTP (if said search key matches a particular entry in said content addressable memory then said CAM returns said particular entry number (pointer), col5 lines 1-5).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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6. Claims 3, 32, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Chandrasekaran (US 6862281), in view of Hunter et al. (US 6,343,289), hereinafter referred to as Chandrasekaran and Hunter.

Regarding claim 3, Chandrasekaran fails to disclose the specific limitations of claim 3. Chandrasekaran does however disclose that a number of different table organizations are applicable to the CAM type lookups and that a Patricia tree is an efficient access structure (col5 lines50-56) and thus provides the motivation to search the table of the lookup engines in a fast and efficient manner.

Hunter discloses an efficient search and organization of a table in which a request to load (key is transferred to a particular address in a first register) a first key from memory that is associated with a database entry and that the load requests includes outputting an address to the memory that corresponds to a location in memory (first register in tree search engine) storing the desired key (particular address in said first register is used to decode said particular thread number associated with said search key, col2 lines 49-55).

It would thus be obvious to a person skilled in that art to incorporate the method of efficiently searching a database using the address of the memory as disclosed by Hunter into the method of segmenting packet routing lookups into multiple levels for sequential search in multiple tables provided in a CAM as disclosed by Chandrasekara

to provide an improved organization of a search of a table for efficiency and better processing time for processing a packet.

Regarding claim 32, Chandrasekaran fails to disclose the specific limitations of claim 32. Chandrasekaran does however disclose of testing the cFLOWRTP to be certain that is a non-null value (col5 lines 10-12) and thus provide the motivation in testing the validity of the returned pointers.

Hunter however discloses of a null pointer if the entry happens to be the last on in the bin (col1 lines47-49) and further discloses that if the last bin has bin reached (search in said CAM using said search key), then no matching entry exists and the search is complete (search key does not match a particular entry in said CAM then said CAM returns a null pointer and determining whether said search is complete, col9 lines 7-12).

It would this been obvious to a person skilled in the art to associate a null pointer disclosed by Hunter into the method of segmenting packet routing lookups into multiple levels for sequential search in multiple tables provided in a CAM as disclosed by Chandrasekara to provide a detection means of when the key search is complete and whether or not the pointer returned is valid (non-null value meaning a match and null value meaning no match).

Regarding claim 33, the combination of Chandrasekara and Hunter discloses all the limitations of claim 33 as discussed with claim 32.

Regarding claim 34, the combination of Chandrasekara and Hunter discloses all the limitations of claim 34 as discussed with claim 32. Hunter further discloses entries, which also include a pointer to the next entry in the bin (loading a register with a pointer, wherein said pointer points to said register, col1 lines 45-46). As mentioned with claim 32, said search is complete only when null pointer is reached for the last one in the bin otherwise search is considered incomplete.

Allowable Subject Matter

7. Claims 15-29, and 35-39 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

8. Claims 15 and 35 is are allowable over the prior art of record since the cited references taken individually or in combination fails to particularly disclose **having said content addressable memory coupled to said tree search engine via an interface unit, wherein said content addressable memory stores a plurality of entries, wherein each of said plurality of entries has an entry number associated with it; and wherein said tree search engine comprises circuitry for identifying said data structure associated with said packet of data.** It is noted that the closest prior art, Chandrasekaran (US 6862281) discloses the method of segmenting packet routing lookups into multiple levels for sequential search in multiple tables provided in a CAM.

However, Chandrasekaran fails to disclose or render obvious to the above underline limitations as claimed.

9. Claims 4-11, 13, and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. These claims are allowable due to the further limitations claim 4, more specifically having said interface unit interfacing said tree search engine and said content addressable memory.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a. Chow et al. (2002/0126672), Method And Apparatus For A Flexible And Reconfigurable Packet Classifier Using Content Addressable Memory.
- b. Ikeda et al. (US6788683), Flow Identification Device, Flow Processing Device, Flow Identifying Method and Flow Processing Method.

Response to Arguments

12. Applicant's arguments see Remarks page 11-13, filed 7/1/2005, with respect to the rejection(s) of claim(s) 1-39 under Corl, Jr. et al. (US 6529897) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Chandrasekaran (US 6862281).

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nguyen Ngo whose telephone number is (571) 272-8398. The examiner can normally be reached on Monday-Friday 7am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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9/10/05